WHAT IS CLAIMED IS:

1. A rotor structure of a line-start permanent magnet (LSPM) synchronous motor including an outer stator (or simply stator hereafter), an inner rotor (or simply rotor hereafter), and an air gap positioned between the stator and the rotor, wherein the inner loop of the stator has a plurality of stator tooth-part having tooth thickness w and a plurality of stator channel-part disposed in staggered manner and in annular shape while the rotor having a center O and a radius R of the circular arcs of the surface of the magnetic poles is divided into an inner loop and an outer loop, the motor comprises:

a shaft positioned at the center of the rotor;

four fan-shaped magnetic poles each having a 90° central angle and their arcs of the surface of the magnetic poles being defined as the "first eccentric circular arcs of the surface of the magnetic poles" with a center of the arc O1 (first eccentric points O1 ) being offset from the center O of the rotor, and a radius of R1, and therefore R - R1 = OS1, also the first eccentric circular arcs of the surface of the magnetic poles making the maximum air gap thickness T two to five times as that of the minimum air gap thickness t1, therefore T = 2t1 ~ 5t1□

four permanent magnets each of them disposed in each of the fan-shaped magnetic poles in the inner loop of the rotor□

A plurality of conductive bar slots for forming squirrel cage winding, the conductive bar slots appearing in pear shape and being disposed in equal space, in annular shape, and in the outer loop of the rotor at each of the fan-shaped magnetic pole that make the space-part form salient tooth-part of the rotor, and the space-part between the fan-shaped magnetic pole is relatively small□and

four recesses appearing in semi-circular shape with radius r and width w (equal to the stator's tooth thickness) and being provided at the mid-point of the

first eccentric circular arcs of the surface of each of the fan-shaped magnetic poles□and the locations of the recesses being aligned with the tooth-part of the rotor when the number of the conductive bar slots of the fan-shaped magnetic poles is an even number while the locations of the recesses being aligned with the conductive bar slots of the rotor when the number of the plurality of the conductive bar slots of the fan-shaped magnetic poles is an odd number□

whereby, except that the conductive bar slots at the location of the semi-circular recesses needs to adequately offset toward the center O1 of the fan-shaped magnetic poles when the number of the conductive bar slots of the fan-shaped magnetic poles is an odd number□ the rest of the conductive bar slots are in equal distance with respect to the center O1 of the fan-shaped magnetic poles.

2. The rotor structure of an LSPM synchronous motor as claimed in claim 1, wherein the conductive bar slots of the rotor are in circular shape.
3. The rotor structure of an LSPM synchronous motor as claimed in claim 1, wherein the permanent magnet of each of the fan-shaped magnetic poles is divided into two pieces, each correspond to a 45 ° central angle, thereby, the configuration of an eight-permanent-magnet of the rotor appears to be an octagon.
4. The rotor structure of an LSPM synchronous motor as claimed in claim 1, wherein the permanent magnet of each of the fan-shaped magnetic poles is also divided into two pieces, each also correspond to a 45 ° central angle□thereby, the configuration of an eight-permanent magnet of the rotor appears to be a four-piece petal.
5. The rotor structure of an LSPM synchronous motor as claimed in claim 1, wherein the permanent magnet of each of the fan-shaped magnetic poles is divided into four pieces□ thereby, the configuration of a sixteen-permanent-magnet of the rotor appears to be in badge shape.

6. The rotor structure of an LSPM synchronous motor as claimed in claim 1, wherein a semi-circle recess is provided on both sides of the original recess□ thereby, there are three recesses in each of the four magnetic poles, and there will be twelve recesses all together□and the location of the recesses depend on the following situations□if the number of the plurality of conductive bar slots in each of the fan-shaped magnetic poles is an even number, the location of the recesses is aligned with the corresponding location of the tooth-part of the rotor, but if the number of the plurality of conductive bar slots in each of the fan-shaped magnetic poles is an odd number, the location of the recesses is aligned with the location of the conductive bar slots of the rotor.
7. The rotor structure of an LSPM synchronous motor as claimed in claim 6, wherein the conductive bar slots of the rotor are in circular shape.
8. The rotor structure of an LSPM synchronous motor as claimed in claim 6, wherein the permanent magnet of each of the fan-shaped magnetic poles is divided into two pieces, each correspond to a 45 ° central angle□thereby, the configuration of an eight-permanent-magnet of the rotor appears to be an octagon.
9. The rotor structure of an LSPM synchronous motor as claimed in claim 6, wherein the permanent magnet of each of the fan-shaped magnetic poles is also divided into two pieces, each also correspond to a 45 ° central angle□thereby, the configuration of an eight-permanent magnet of the rotor appears to be a four-piece petal.
10. The rotor structure of an LSPM synchronous motor as claimed in claim 6, wherein the permanent magnet of each of the fan-shaped magnetic poles is divided into four pieces□thereby, the configuration of a sixteen-permanent-magnet of the rotor appears to be in badge shape.
11. The rotor structure of an LSPM synchronous motor as claimed in claim 1, wherein the recess at each of the fan-shaped magnetic poles is removed and

replaced by an arc defined as the "second eccentric circular arc of the surface of the magnetic pole" with a center of the arc O2 (second eccentric points O2 ) being offset from the center O of the rotor, and a radius of R2, and therefore R2 - R = OS2, also the second eccentric circular arcs of the surface of the magnetic poles make the maximum air gap thickness T two to five times as that of the minimum air gap thickness t2, therefore T = 2t2 ~ 5t2.

12. The rotor structure of an LSPM synchronous motor as claimed in claim 11, wherein the conductive bar slots of the rotor are in circular shape.

13. The rotor structure of an LSPM synchronous motor as claimed in claim 11, wherein the permanent magnet of each of the fan-shaped magnetic poles is divided into two pieces, each correspond to a 45 ° central angle, thereby, the configuration of an eight-permanent-magnet of the rotor appears to be an octagon.

14. The rotor structure of an LSPM synchronous motor as claimed in claim 11, wherein the permanent magnet of each of the fan-shaped magnetic poles is also divided into two pieces, each also correspond to a 45 ° central angle□thereby, the configuration of an eight-permanent magnet of the rotor appears to be a four-piece petal.

15. The rotor structure of an LSPM synchronous motor as claimed in claim 11, wherein the permanent magnet of each of the fan-shaped magnetic poles is divided into four pieces□thereby, the configuration of a sixteen-permanent-magnet of the rotor appears to be in badge shape.